



Rapport d'essai / Test report

N° 200804-4438CR-R1-E

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DELIVRE A / ISSUED TO

: TAGSYS S.A.
180, Chemin de Saint Lambert
13821 LA PENNE SUR HUVEAUNE
FRANCE

Objet / Subject

: Essais de compatibilité électromagnétique conformément aux normes FCC CFR 47 Part 15, Subpart C.
Electromagnetic compatibility tests according to the standards FCC CFR 47 Part 15, Subpart B and Subpart C

Matériel testé / Apparatus under test :

- Produit / Product : Lecteur de tag RFID / RFID tag reader
- Marque / Trade mark : TAGSYS
- Constructeur / Manufacturer : TAGSYS
- Type / Model : L400-2 (ANTENNAS MAT AND AERO R200X300)
- N° de série / serial number * : H0744002C0 *
- FCC ID : QHKMEDIOL400CHAN2

* : information donnée par le client / information given by the customer

Date des essais / Test date

: Du 17 au 18 Avril 2008 / From April 17th to 18th, 2008

Lieu d'essai / Test location

: LCIE
170 rue de Chatagnon
Z.I Centr'alp
38430 MOIRANS - France

Test réalisé par / Test performed by

: Laurent CHAPUS / Anthony MERLIN

Ce document comporte / Composition of document : 34 pages.

MOIRANS, LE 26 JUIN 2008 / JUNE 26TH, 2008

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Anthony MERLIN

Approuvé par / Approved by, INDUSTRIES ELECTRIQUES
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1. TEST PROGRAM

Standard : FCC CFR 47, PART 15, Subpart C

ANSI C63-4 (2003).

Requirements for intentional radiator. Chapter 15.225 (Operation within the band 13.110-14.010MHz)

Standard : FCC CFR 47, PART 15, Subpart B

ANSI C63-4 (2003).

Requirements for unintentional radiator. Class B computer peripheral.

- Radiated emissions from 30MHz to 1GHz
- Conducted emissions from 150kHz to 30MHz

General conclusion:

Measures performed on the sample of the product L400-2, SN: H0744002C0, in configuration and description presented in this test report, show compliance levels with FCC CFR 47, Part 15 B and Part 15 C.

2. SYSTEM TEST CONFIGURATION

2.1. JUSTIFICATION

The system was configured for testing in a typical fashion (as a customer would normally use it).

The L400-2 is tested with the 13.56MHz antennas:

- MAT (output RF power set at 4W) Horizontal position, 10cm above ground plane
- AERO R200/300 (output RF power set at 4W) Vertical position

The L400-2 reader is considered as a computer peripheral device as it is used in conjunction with a PC.

2.2. HARDWARE IDENTIFICATION

- Equipment under test (EUT):

L400-2

Serial number: H0744002C0

FCC ID: QHKMEDIOL400CHAN2

The L400 reader is supplied with the AC/DC power adapter SWITCHBOX model FDF0453-A
(Input: 100-240V / 50-60Hz; Output: 18-24Vdc / 2.5A)

- Input/output on the L400-2 reader :

- * Serial RS232 connector (DB9 connector)
- * USB port
- * Ethernet 10/100 (RJ45 connector)
- * Channel 1 antenna connector (SMA connector)
- * Channel 2 antenna connector (SMA connector)
- * I/O ports (DB9 connector)
- * Power supply (24Vdc)
- * TAGSYS Service connector (for TAGSYS internal use only)



- **Auxiliaries used for testing:**

Trade Mark – Model Number (Serial number)	FCC ID	Description	Cable description
HEWLETT PACKARD –Vectra VL420.DT Sn: FR14122957	DOC	Personal Computer	Power cable: unshielded Serial cable: shielded
HEWLETT PACKARD P/N: C4742-60101 Sn: C990897683	DOC	Keyboard	PS2 cable (1.2m)
DELL M/N : M-UK Sn : HCJ61966988	DOC	Mouse	USB cable (1.2m)
Hewlett Packard P/N : D2846 Sn : JP4001000	DOC	Video Monitor	Standard AC power cable SVGA cable, shielded
TAGSYS - RFID tag (I-Code1/270TL)			
TAGSYS - RFID tag (ISO 15693)			
TAGSYS- MAT antenna Sn: TO802029A0		13.56MHz RF antenna	BNC, 50Ω, 6 ferrites on reader's side
TAGSYS- AERO R200/300 antenna Sn: T0603002A0		13.56MHz RF antenna	BNC, 50Ω, 6 ferrites on reader's side

- **I/O cables used for testing:**
 - 1x Antenna RF cable, coaxial 50Ω: 3m /5m
 - 1x Serial RS232 cable, shielded: 1.5m
 - 1x I/O cable, DB9 connector, shielded: 1.5m
 - 1x USB cable, shielded: 1.8m
 - 1x Ethernet cable, Cat5e, FTP, shielded: 5m
 - 3x Mains AC power supply cables, unshielded: 1.8m (EUT, PC and monitor)

2.3. EQUIPMENT MODIFICATIONS

- Mat antenna: For Radiated Emission test, 2 ferrites on antenna cable (REF: 7427111 Würth Elektronik).
- AERO R200/300 antenna: For Radiated Emission test, 1 ferrite on antenna cable (REF: 7427111 Würth Elektronik).

2.4. EUT EXERCISE SOFTWARE

The EUT exercise program used during radiated and conducted testing was exercised the L400 reader in a manner similar to a typical use.

The test program permits the continuous reading of a RFID tag.

PC Software used: TAGSYS EXPLORER V1.0.8

2.5. EUT CONFIGURATION

Tests are performed with RFID tags compatible to I-Code1 (220TL) and ISO 15693 standards.

2.6. SPECIAL ACCESSORIES

The RF antenna cable is coaxial 50Ω with six ferrites on the reader's side.

Ethernet, serial and I/Os cable are shielded. USB is standard cable.

3. RADIATED EMISSION DATA

3.1. CLIMATIC CONDITIONS

Date of test : April 17th, 2008
Test performed by : Laurent CHAPUS / Anthony MERLIN
Atmospheric pressure : 970mb
Relative humidity : 35%
Ambient temperature : 20°C

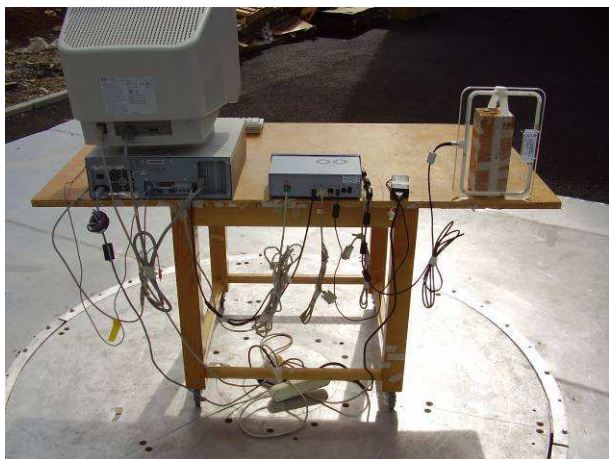
3.2. TEST SETUP

The installation of EUT is identical for pre-characterization measurement in a 3 meters full anechoic chamber and for measures on a 10 meters Open site.

Power supply: 230V/50Hz

The EUT is placed on a non-conducting table of 80cm height.

Antennas are set in horizontal positions for MAT antenna and vertical position for AERO R200/300.



Radiated emission test setup

Equipment configuration and running mode:

A RFID tag is placed in the vicinity of the antenna. The reader is communicating with the PC with the USB link. The Ethernet cable is connected to the PC. A ping function is performed on the LAN.

The RF output power is set at the maximum rated power for each antenna.

Worst case setup is search for:

- Antenna position
- RF channel selection (Ch1 or Ch2)

3.3. TEST SEQUENCE AND RESULTS**3.3.1. Pre-characterization at 3 meters [9kHz-30MHz]**

A pre-scan of all the setup has been performed in a 3 meters full anechoic chamber.

The distance between EUT and antenna is 3 meters. For Pre-characterization, the loop antenna position was rotated during the test for maximized the emission measurement.

Frequency band investigated is 9kHz to 30MHz.

The pre-characterization graphs are obtained in PEAK detection.

See graphs for 9kHz-30MHz band:	MAT ANTENNA	graph#1	(See annex 1)
See graphs for 9kHz-30MHz band:	AERO R200/300 ANTENNA	graph#2	(See annex 1)

3.3.2. Pre-characterization at 3 meters [30MHz-1GHz]

A pre-scan of all the setup has been performed in a 3 meters full anechoic chamber.

The distance between EUT and antenna is 3 meters. Test is performed in horizontal (H) and vertical (V) polarization with a log-periodic antenna TESEQ CBL6144. The EUT is being rotated on 360° during the measurement. The pre-characterization graphs are obtained in PEAK detection.

See graphs for 30MHz-1GHz:

MAT ANTENNA

H polarization	graph#3	(See annex 1)
V polarization	graph#4	(See annex 1)

AERO R200/300 ANTENNA

H polarization	graph#5	(See annex 1)
V polarization	graph#6	(See annex 1)

**3.3.3. Characterization on 10 meters open site below 30 MHz**

The product has been tested according to ANSI C63.4 (2003), FCC part 15 subpart C. Radiated Emissions were measured on an open area test site. A description of the facility is on file with the FCC.

The product has been tested at a distance of **10 meters** from the antenna and compared to the FCC part 15 subpart C §15.225 limits in the frequency range 13.553MHz 13.567MHz. Measurement bandwidth was 9kHz.

Antenna height was 1m for both horizontal and vertical polarization.

Antenna was rotated around its vertical axis.

Continuous linear turntable azimuth search was performed with 360 degrees range.

3 axis measurements were performed for antenna positions.

A summary of the worst case emissions found in all test configurations and modes is shown on clauses 3.2.1.

MAT Antenna:

Frequency (MHz)	QPeak Limit (dBµV/m) @ 30m	QPeak (dBµV/m)	QPeak-Lmt (Margin dB)	Turntable Angle (deg)	Ant. Pol./ Angle (deg)	Tot Corr (dB)
13.56 * ¹	84.0	51.8	-32.2	90°	V / 0°	37.9
27.12	29.5			NT		39.7

AERO R200/300 Antenna:

Frequency (MHz)	QPeak Limit (dBµV/m) @ 30m	QPeak (dBµV/m)	QPeak-Lmt (Margin dB)	Turntable Angle (deg)	Ant. Pol./ Angle (deg)	Tot Corr (dB)
13.56 * ¹	84.0	81.2	-2.8	90°	V / 90°	37.9
27.12	29.5			NT		39.7

NT: Not Traceable

*¹: Measure have been done at 10m distance and corrected according to requirements of 15.209.e) (M@30m = M@10m-19.1dB)



Limits Subclause §15.225

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
13.553-13.567	15 848 84 dBµV/m	30
13.410-13.553 13.567-13.710	334 50.5 dBµV/m	30
13.110-13.410 13.710-14.010	106 40.5 dBµV/m	30

See chapter 5 of this test report for band edge measurements.

3.3.4. Characterization on 3 meters open site from 30MHz to 1GHz

The product has been tested according to ANSI C63.4 (2003), FCC part 15 subpart C. Radiated Emissions were measured on an open area test site. A description of the facility is on file with the FCC.

The product has been tested at a distance of **3 meters** from the antenna and compared to the FCC part 15 subpart C §15.209 limits. Measurement bandwidth was 120kHz from 30 MHz to 1GHz.

Antenna height search was performed from 1m to 4m for both horizontal and vertical polarization. Continuous linear turntable azimuth search was performed with 360 degrees range.

2 axis measurements were performed for antennas positions (vertical and horizontal positions, with 360° rotation)

A summary of the worst case emissions found in all test configurations and modes is shown on clause 3.2.2.

MAT ANTENNA (Worst case final data result):

No	Frequency (MHz)	QPeak Limit (dBµV/m)	Qpeak (dBµV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
1	47.66	40	38.1	-1.9	195	V	130	12.3	Frequency emitted by PC
2	67.755	40	37.7	-2.3	195	V	130	10	2 Ferrite on antenna cable (REF: 2x 7427111 WE)
3	81.359	40	36.8	-3.2	270	H	220	8.5	
4	113.311	43.5	25.9	-17.6	240	V	130	15.7	
5	300.06	46	19.8	-26.2	75	H	190	18.1	
6	786.432	46	37.0	-9.0	0	V	120	26.9	
7	989.847	54	45.6	-8.4	190	V	120	30.5	

AERO R200/300 ANTENNA (Worst case final data result):

No	Frequency (MHz)	QPeak Limit (dBµV/m)	Qpeak (dBµV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
1	47.66	40	38.1	-1.9	195	V	130	12.3	Frequency emitted by PC
2	67.826	40	37.6	-2.4	195	V	240	10	1 Ferrite on antenna cable (REF: 7427111 WE)
3	113.353	43.5	28.9	-14.6	115	V	130	15.7	
4	125.216	43.5	23.9	-19.6	195	H	240	16.2	
5	151.479	43.5	18.9	-24.6	255	V	150	16.4	
6	300.021	46	22.5	-23.5	120	H	150	18.1	
7	786.41	46	30.9	-15.1	315	H	210	26.9	
8	989.837	54	40.9	-13.1	145	H	140	30.5	

RESULTS: PASS

**3.4. FIELD STRENGTH CALCULATION**

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follow:

$$FS = RA + AF + CF - AG$$

Where FS = Field Strength
 RA = Receiver Amplitude
 AF = Antenna Factor
 CF = Cable Factor
 AG = Amplifier Gain

Assume a receiver reading of 52.5dB μ V is obtained. The antenna factor of 7.4 and a cable factor of 1.1 is added. The amplifier gain of 29dB is subtracted, giving a field strength of 32 dB μ V/m.

$$FS = 52.5 + 7.4 + 1.1 - 29 = 32 \text{ dB}\mu\text{V/m}$$

The 32 dB μ V/m value can be mathematically converted to its corresponding level in μ V/m.

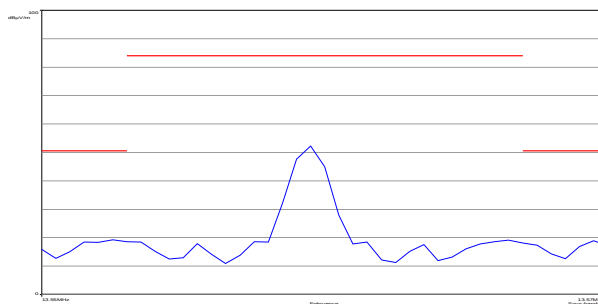
$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32\text{dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}.$$

**4. BAND-EDGE COMPLIANCE §15.209****4.1. CLIMATIC CONDITIONS**

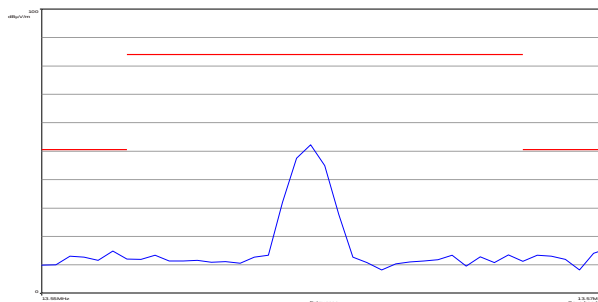
Date of test : April 18th, 2008
Test performed by : Laurent CHAPUS / Anthony MERLIN
Atmospheric pressure : 970mb
Relative humidity : 35%
Ambient temperature : 20°C

4.2. EQUIPMENT CONFIGURATION

The equipment is configured for tag reading, ISO 15693 and I-Code 1 (C270) standards.

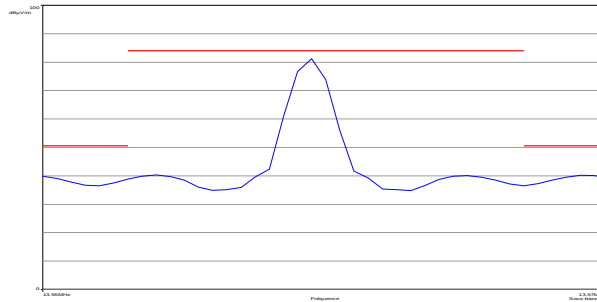
4.3. Frequency band 13.553-13.567MHz – MAT antenna (TAG ISO 15693)

RBW = 1kHz, VBW = 3kHz

4.4. Frequency band 13.553-13.567MHz – MAT antenna (TAG I-CODE1)

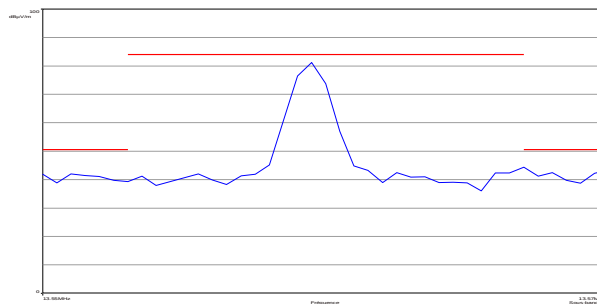
RBW = 1kHz, VBW = 3kHz

4.5. Frequency band 13.553-13.567MHz – AERO R200/300 antenna (TAG ISO 15693)



RBW = 1kHz, VBW = 3kHz

4.6. Frequency band 13.553-13.567MHz – AERO R200/300 antenna (TAG I-CODE1)



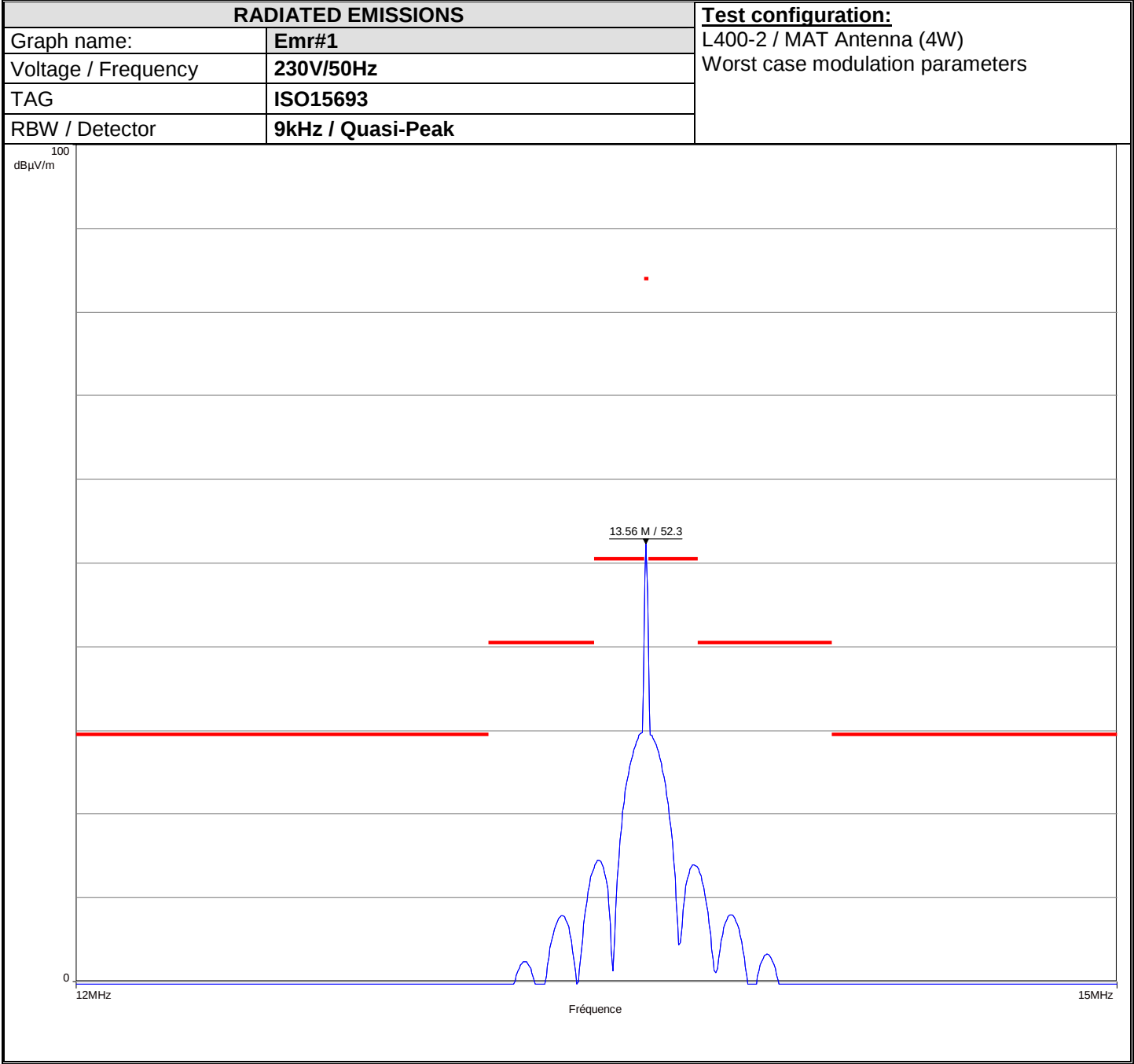
RBW = 1kHz, VBW = 3kHz

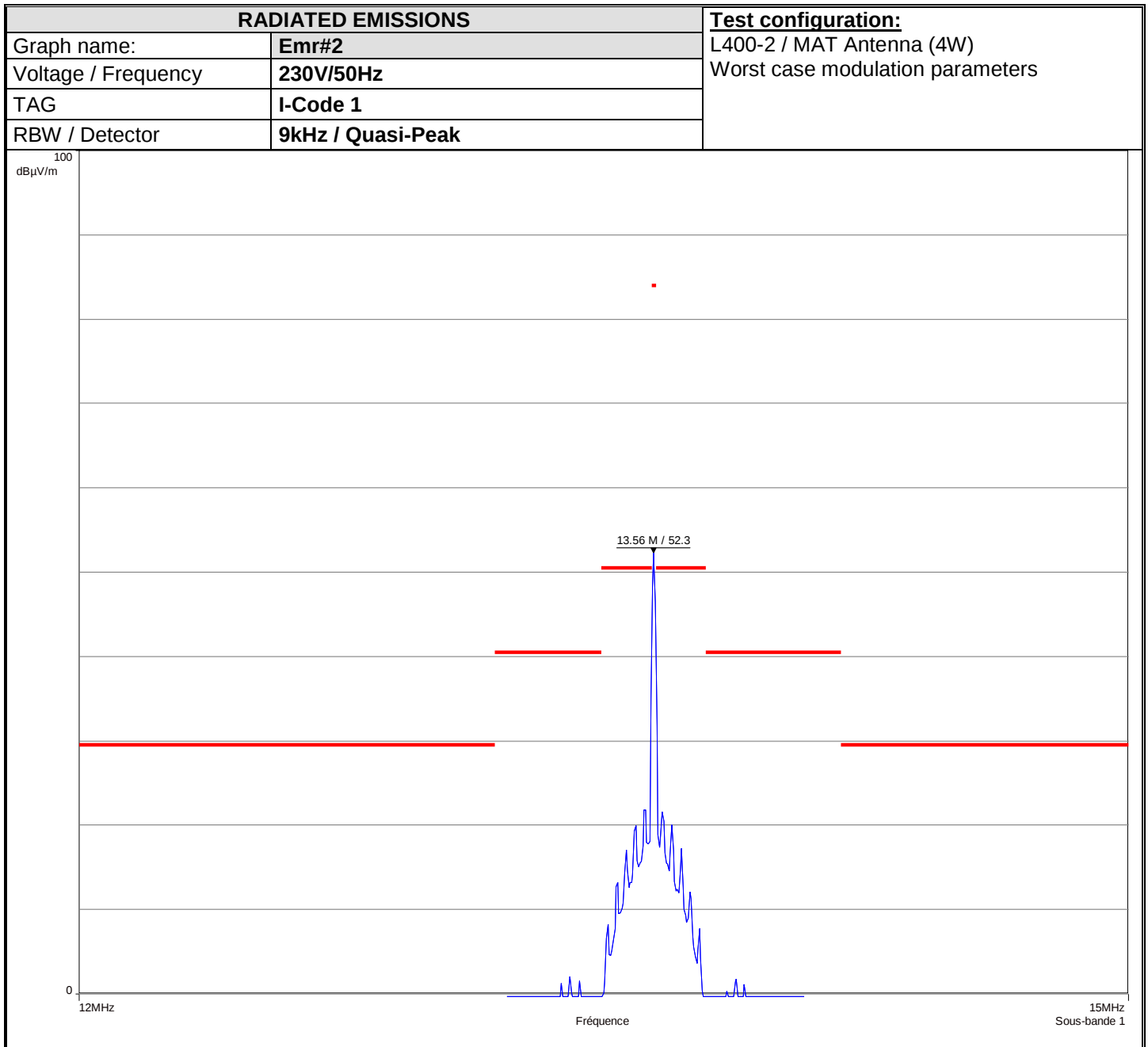
**4.7. Frequency band 13.110-14.010MHz**

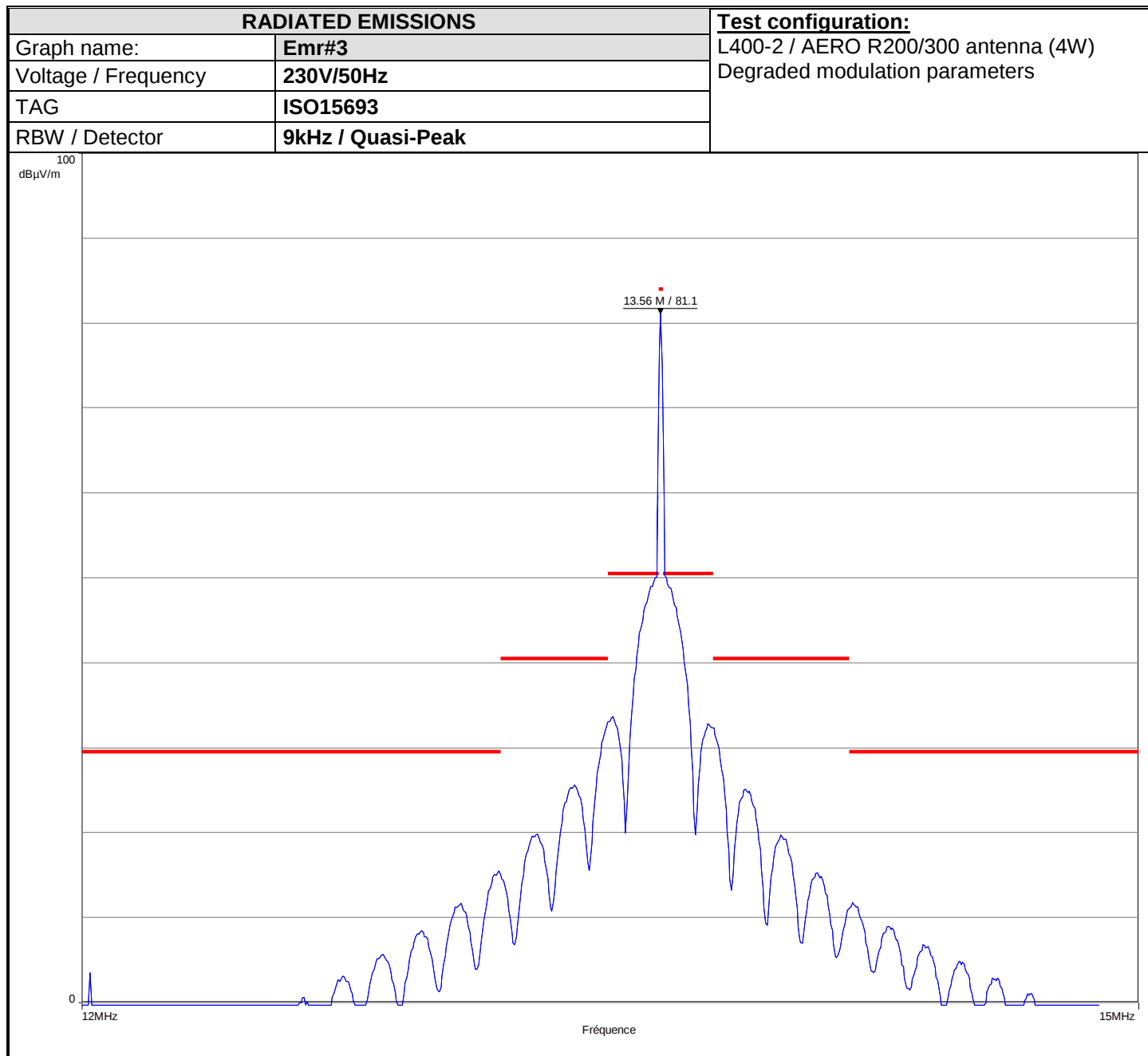
Following plots show radiated emission level in the frequency band 13.110-14.010MHz with a RBW of 9kHz and a quasi-peak detector.

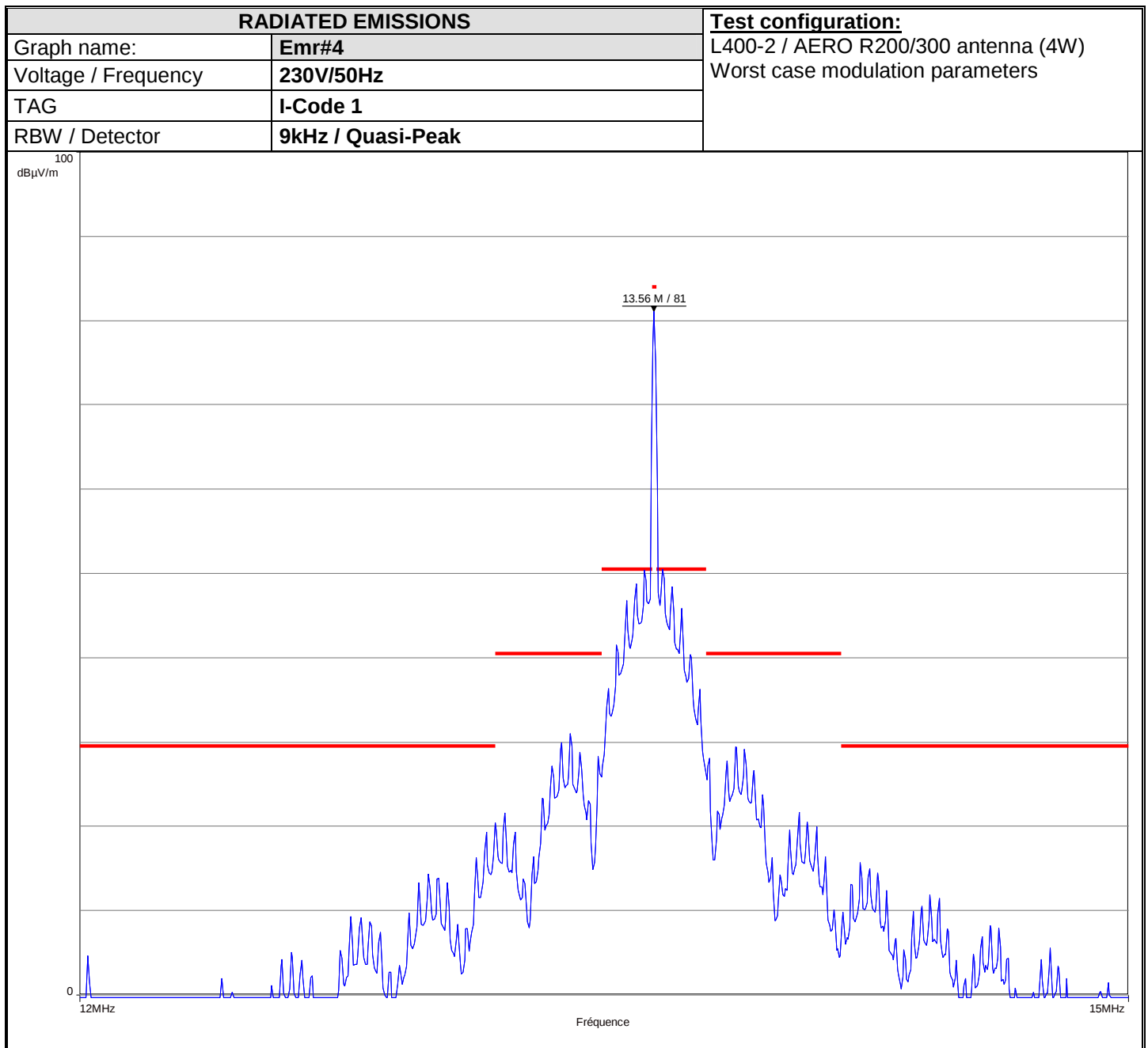
The graphs are obtained with a measuring receiver ESH3.

Graph name	Antenna type / Position	Output power	TAG read	Modulation parameters	Comments
EMR#1	MAT / Horizontal	4W	ISO 15693	Command Modulation Depth: 10% EOF modulation Depth: 100% Data coding mode: 1 of 4 Data Rate: Fast	Worst case modulation parameters
EMR#2	MAT / Horizontal	4W	I-Code 1	Bit coding: Fast	Worst case modulation parameters
EMR#3	AERO R200/300 / Vertical	4W	ISO 15693	Command Modulation Depth: 10% EOF modulation Depth: 10% Data coding mode: 1 of 256 Data Rate: Fast	Degraded modulation parameters
EMR#4	AERO R200/300 / Vertical	4W	I-Code 1	Bit coding: Fast	Worst case modulation parameters









**5. CONDUCTED EMISSION DATA****5.1. CLIMATIC CONDITIONS**

Date of test : April 18th, 2008
Test performed by : Laurent CHAPUS / Anthony MERLIN
Atmospheric pressure : 970mb
Relative humidity : 35%
Ambient temperature : 20°C

5.2. SETUP FOR CONDUCTED EMISSIONS MEASUREMENT

The product has been tested according to ANSI C63.4-(2003) and FCC Part 15 subpart C.

The product has been tested with 110V/60Hz power line voltage and compared to the FCC Part 15 subpart C §15.207 limits. Measurement bandwidth was 9kHz from 150 kHz to 30 MHz.

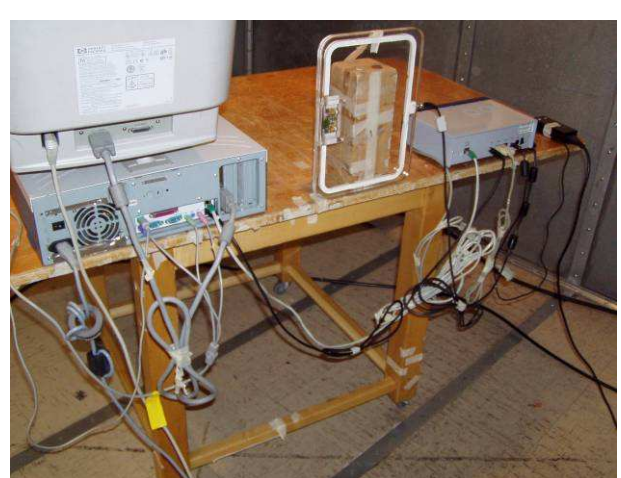
Measurement is made with a Rohde & Schwarz ESH3 receiver in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary. The LISN (measure) is 50Ω / 50μH.

The Peak data are shown on plots in annex 1. Quasi-Peak and Average measurements are detailed in a table with frequencies and levels measured.

Interconnecting cables and equipment's were moved to position that maximized emission. A summary of the worst case emissions found in all test configurations and modes is shown on the following page.

5.3. TEST SETUP

The EUT is placed on a table at 0.8m height. The cable has been shorted to 1meter length. The EUT is powered trough the LISN (measure). The peripheral equipment (PC/monitor) is connected to a separate LISN.



**5.4. TEST SEQUENCE AND RESULTS**

Measurements are performed on the phase (L1) and neutral (N) of power lines of the reader.

A measurement is also performed with a 50Ω dummy load replacing the transmitter antenna in order to demonstrate that some 13.56MHz may be cross-coupled to AC line connection.

Graphs are obtained in PEAK detection.

Measures are also performed in Quasi-Peak and Average for any strong signal.

MAT antenna:

Measure on L1: graph Emc#1 (see annex 1)

Measure on N: graph Emc#2 (see annex 1)

AERO R200/300 antenna:

Measure on L1: graph Emc#3 (see annex 1)

Measure on N: graph Emc#4 (see annex 1)

Dummy load (50Ω) replacing the antenna at the end of the cable:

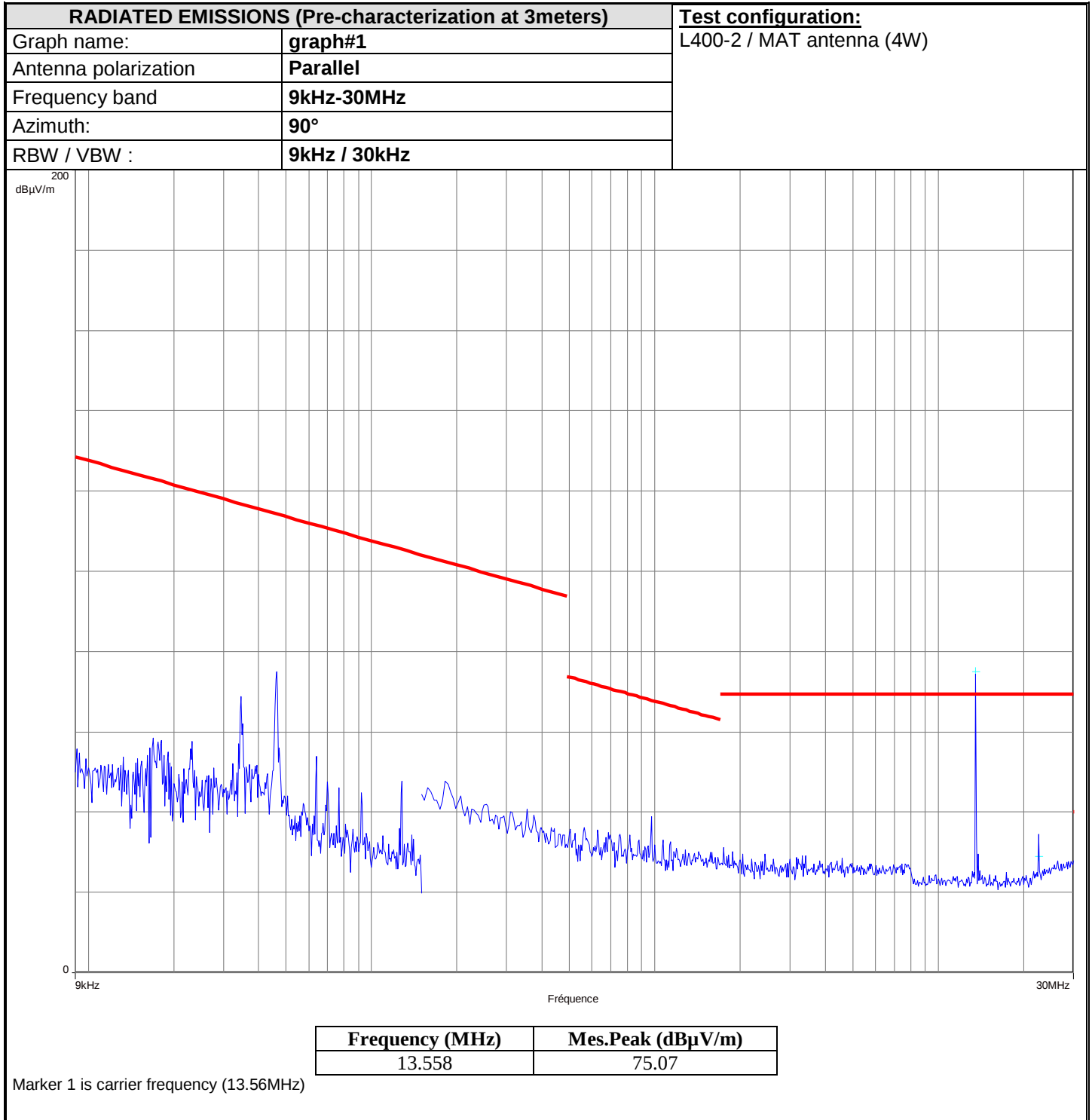
Measure on L1: graph Emc#5 (see annex 1)

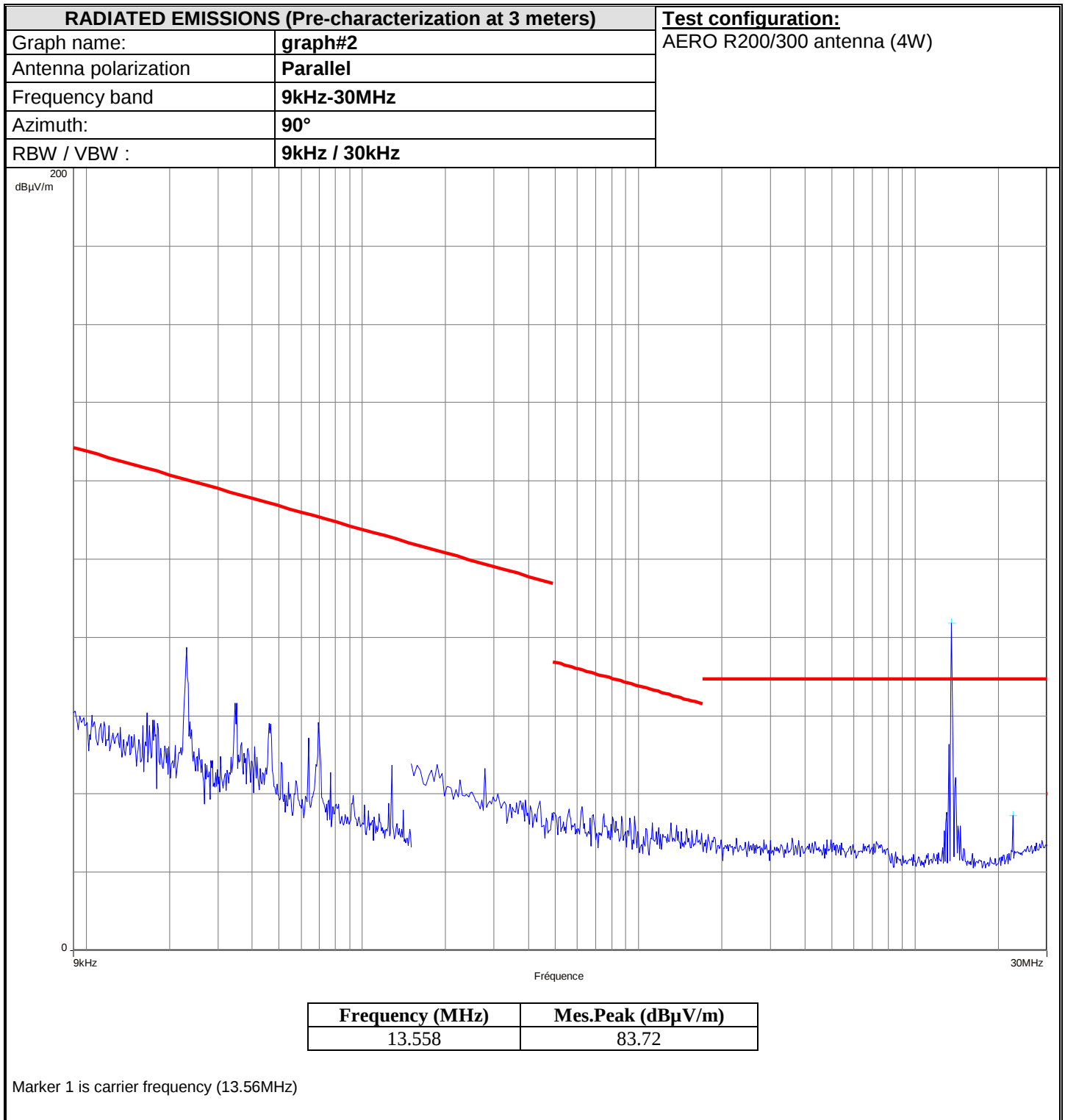
Measure on N: graph Emc#6 (see annex 1)

RESULT: PASS

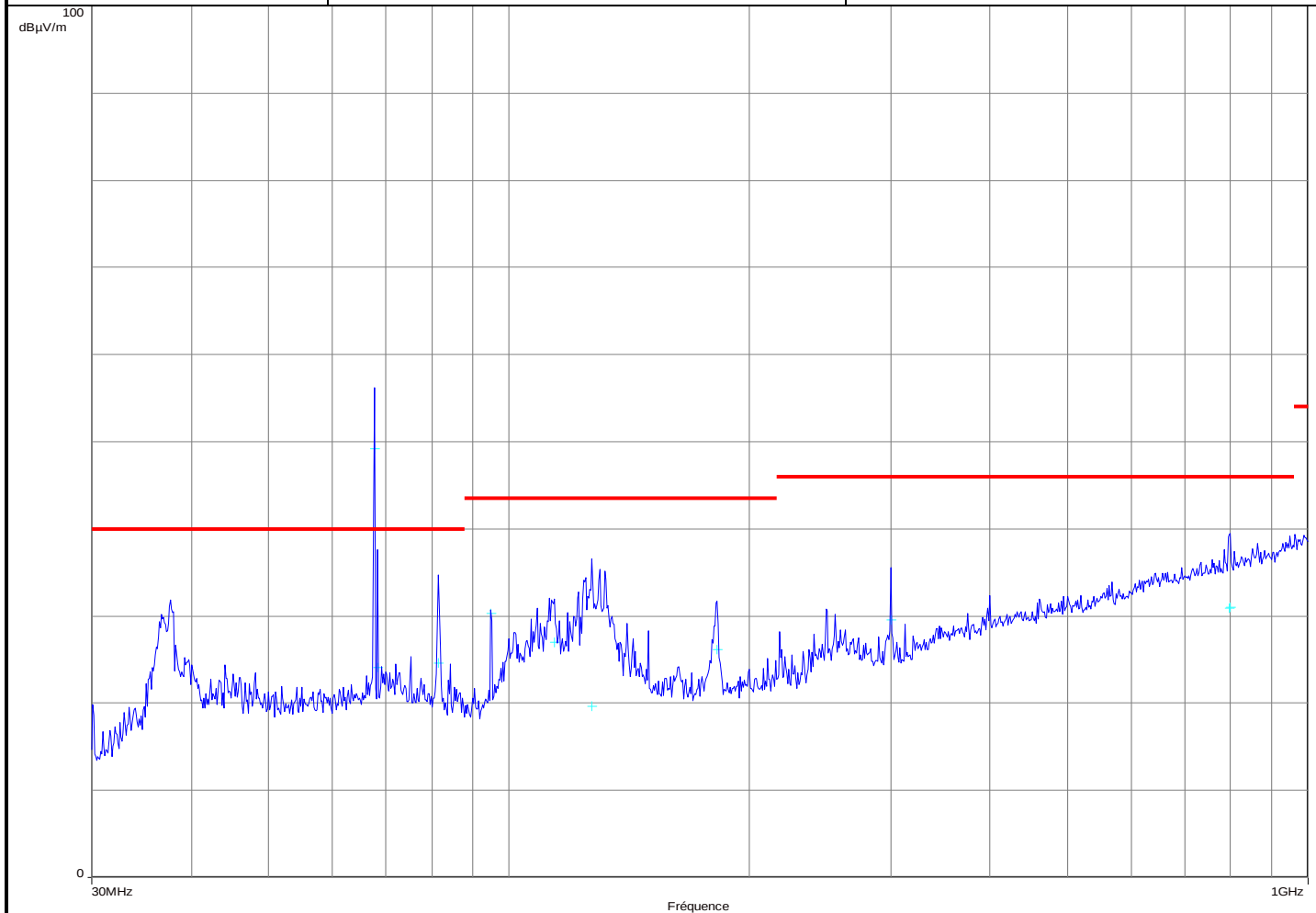


6. ANNEX 1 (GRAPHS)



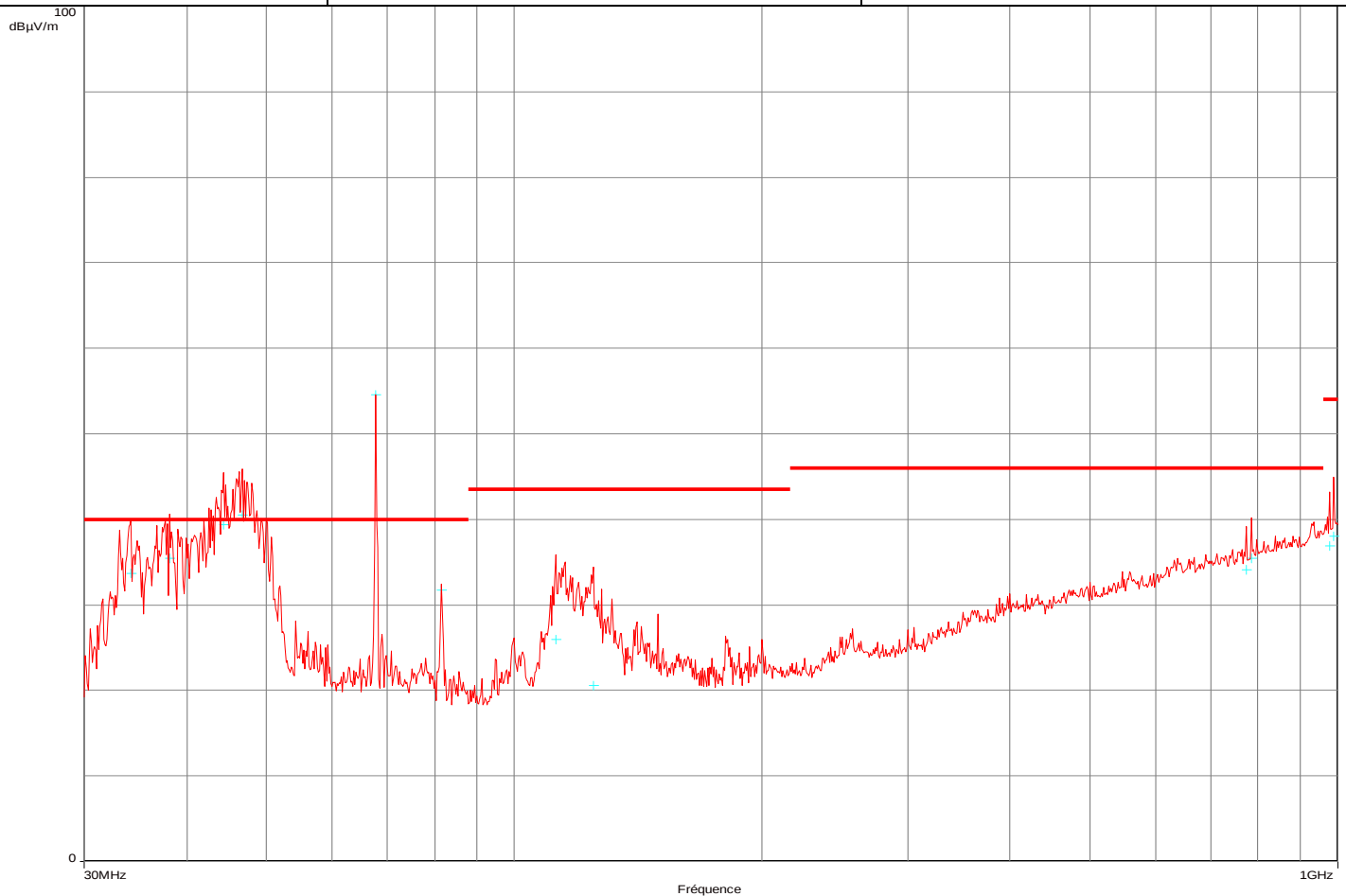


RADIATED EMISSIONS (3meters)		Test configuration:
Graph name:	graph#3	L400-2 / MAT antenna (4W)
Antenna polarisation	Horizontal	
Frequency band	30MHz – 1GHz	
Azimuth:	From 0° to 360° (Max-hold measurement)	
RBW / VBW :	120kHz / 300kHz	

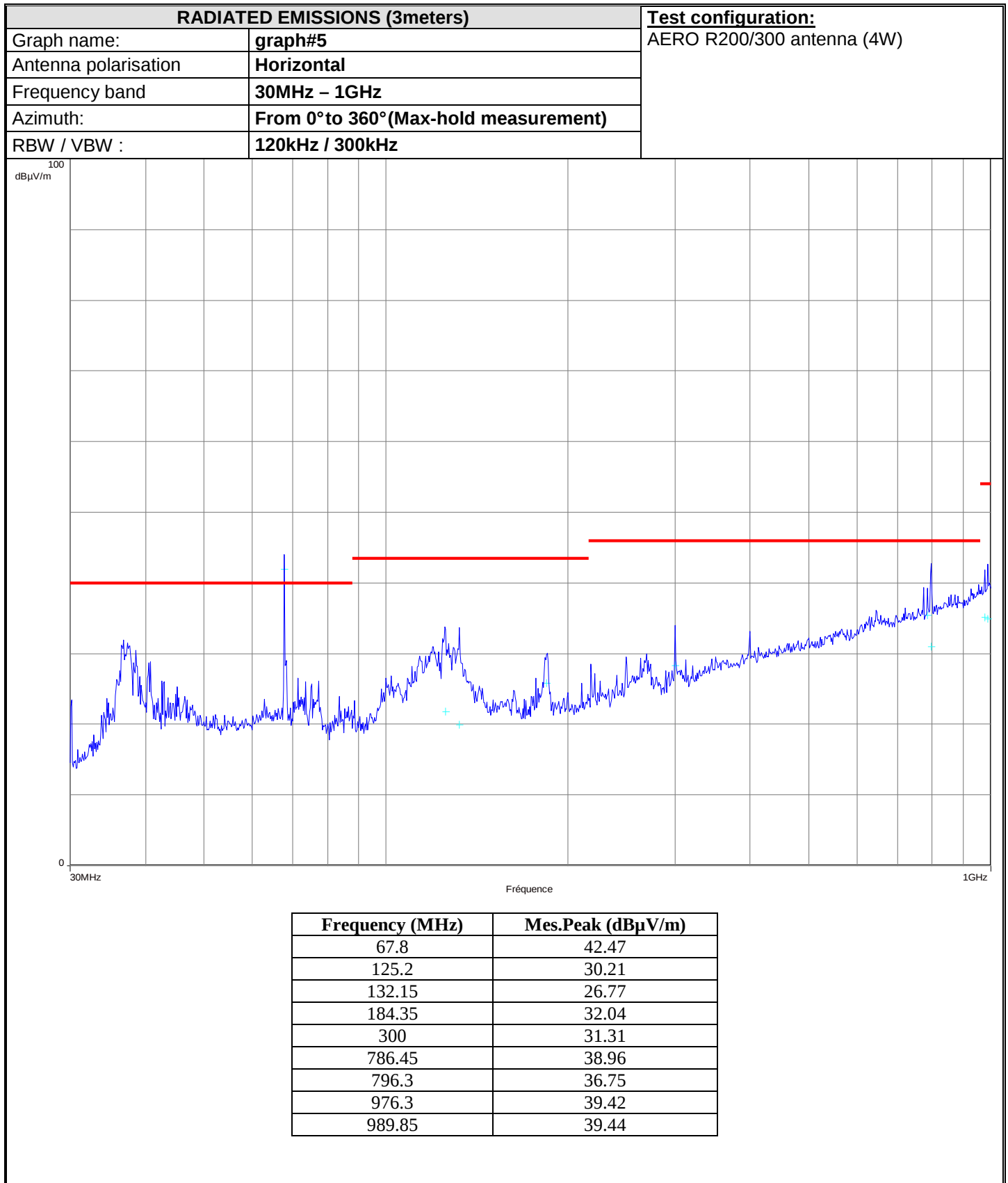


Frequency (MHz)	Mes.Peak (dBμV/m)
67.8	49.57
68.35	32.66
81.35	28.18
94.9	31.87
113.9	32.9
127	28.28
182.1	32.87
300	32.33
795.75	36.32
798.4	36.41

RADIATED EMISSIONS (3meters)		Test configuration:
Graph name:	graph#4	L400-2 / MAT antenna (4W)
Antenna polarisation	Vertical	
Frequency band	30MHz – 1GHz	
Azimuth:	From 0° to 360° (Max-hold measurement)	
RBW / VBW :	120kHz / 300kHz	

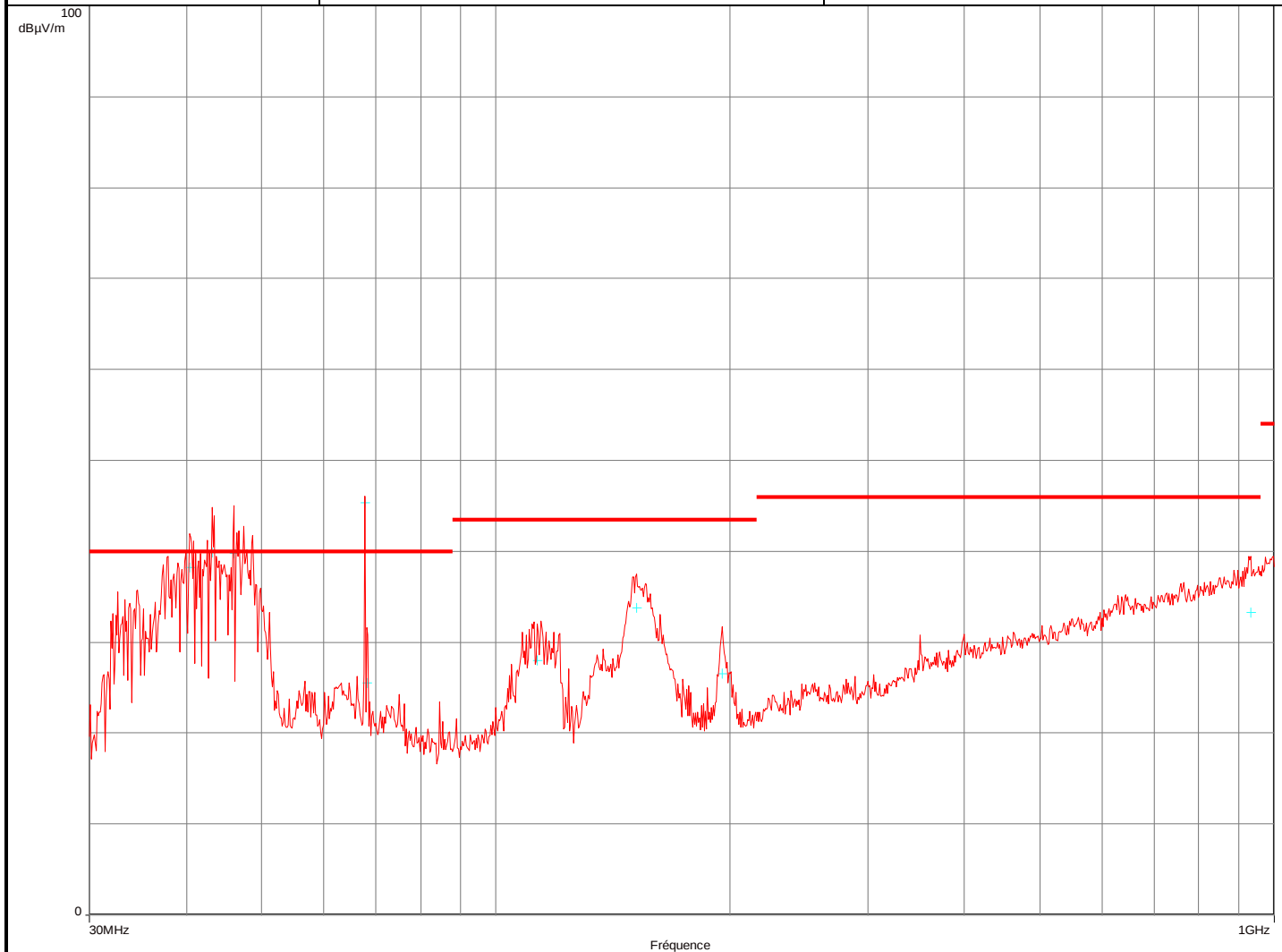


Frequency (MHz)	Mes.Peak (dBμV/m)
34.2	38.07
38.1	40.18
44.35	44.36
46.7	45.63
67.8	54.96
81.35	36.8
112.4	33.77
124.7	29.54
772.9	37.67
786.45	38.47
976.3	40.81
989.85	41.9

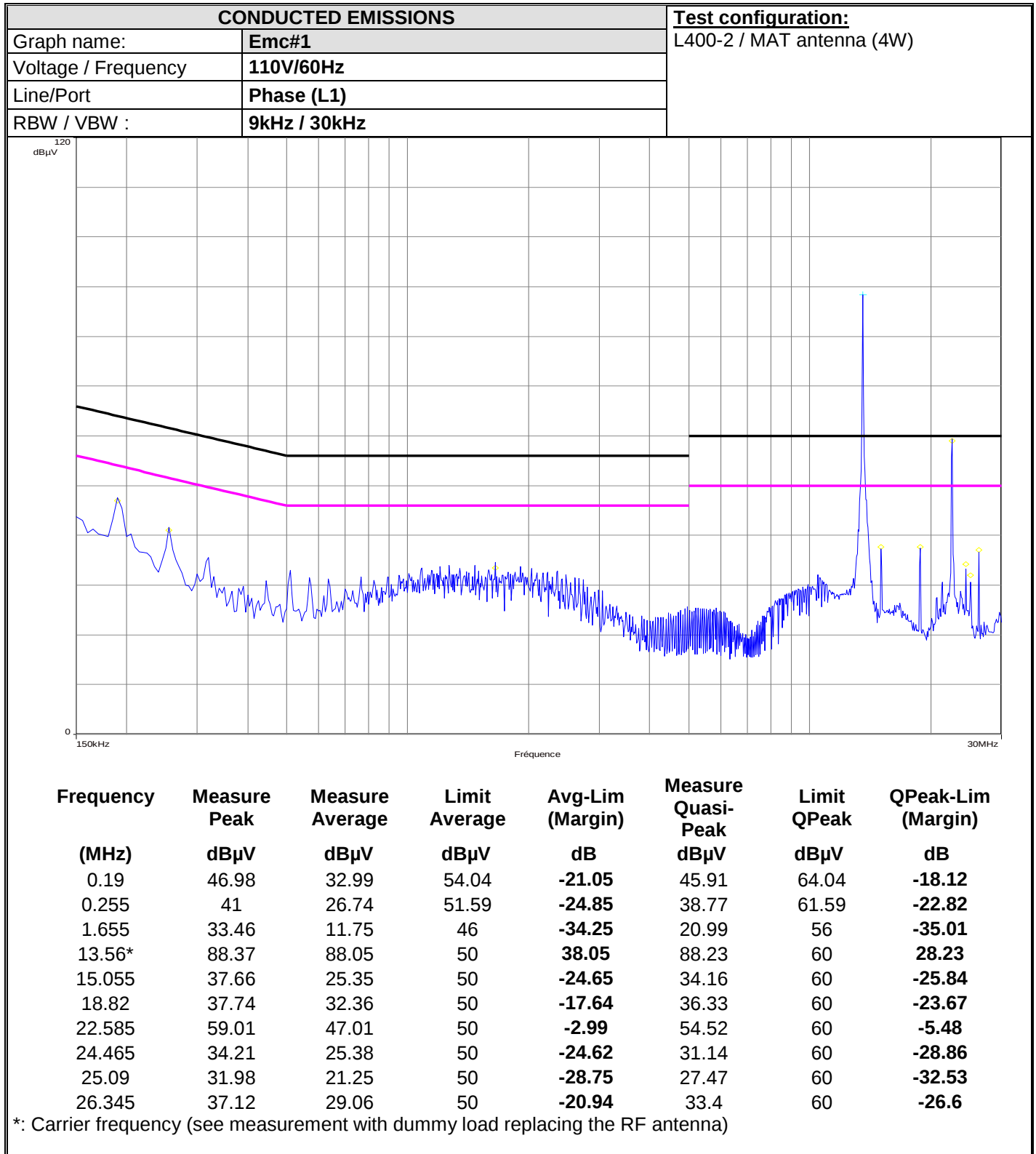


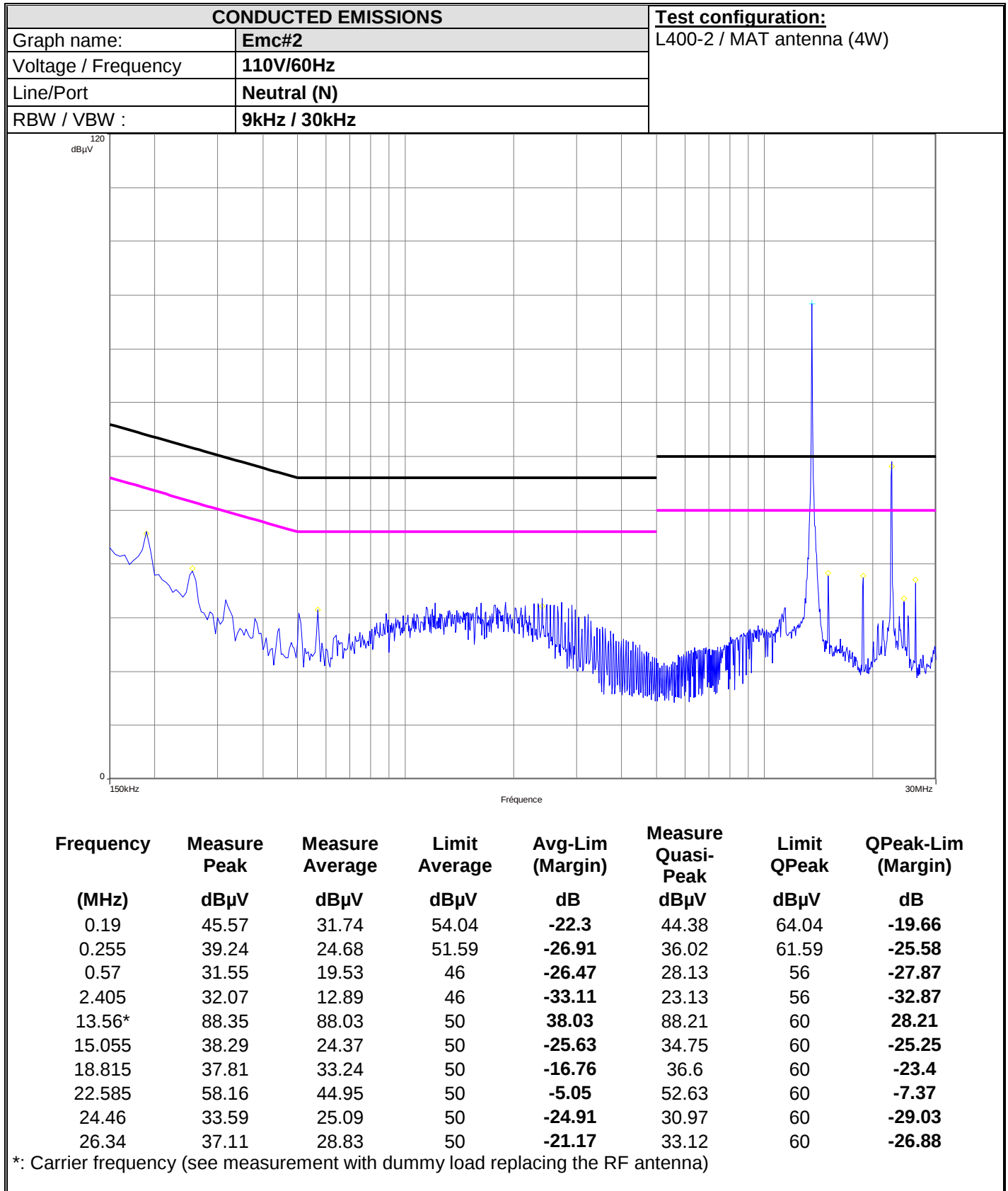


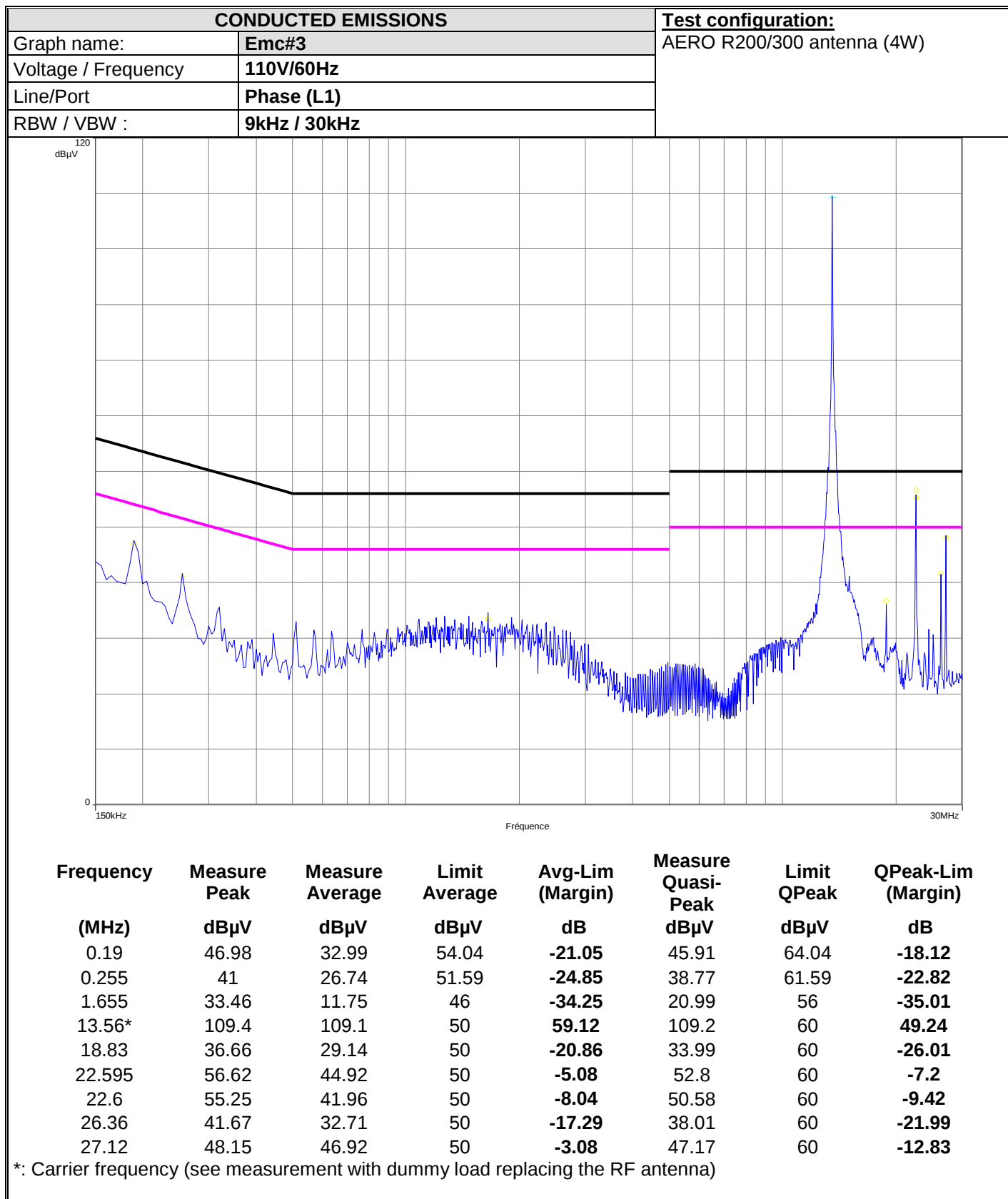
RADIATED EMISSIONS (3meters)		Test configuration:
Graph name:	graph#6	AERO R200/300 antenna (4W)
Antenna polarisation	Vertical	
Frequency band	30MHz – 1GHz	
Azimuth:	From 0° to 360° (Max-hold measurement)	
RBW / VBW :	120kHz / 300kHz	

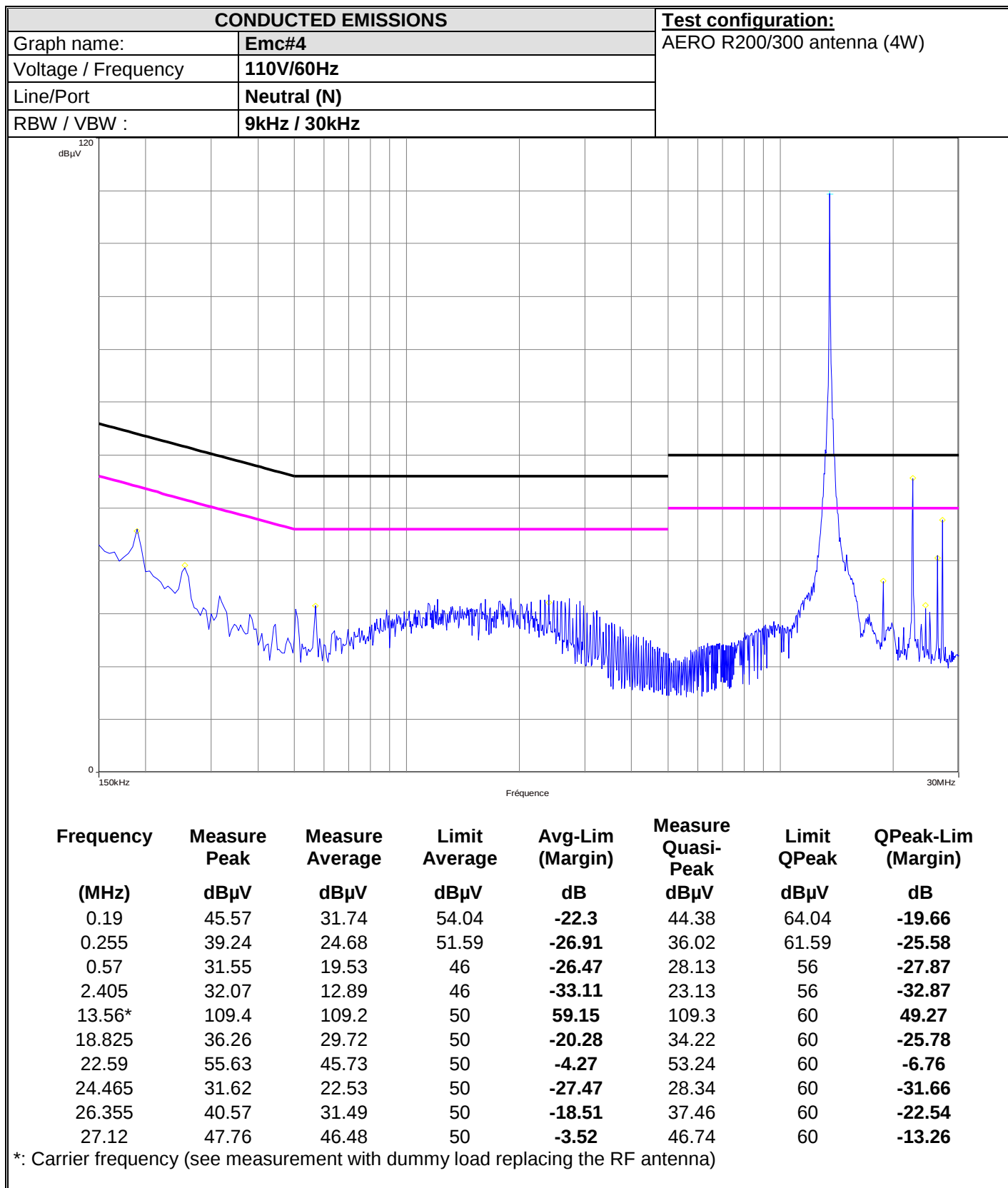


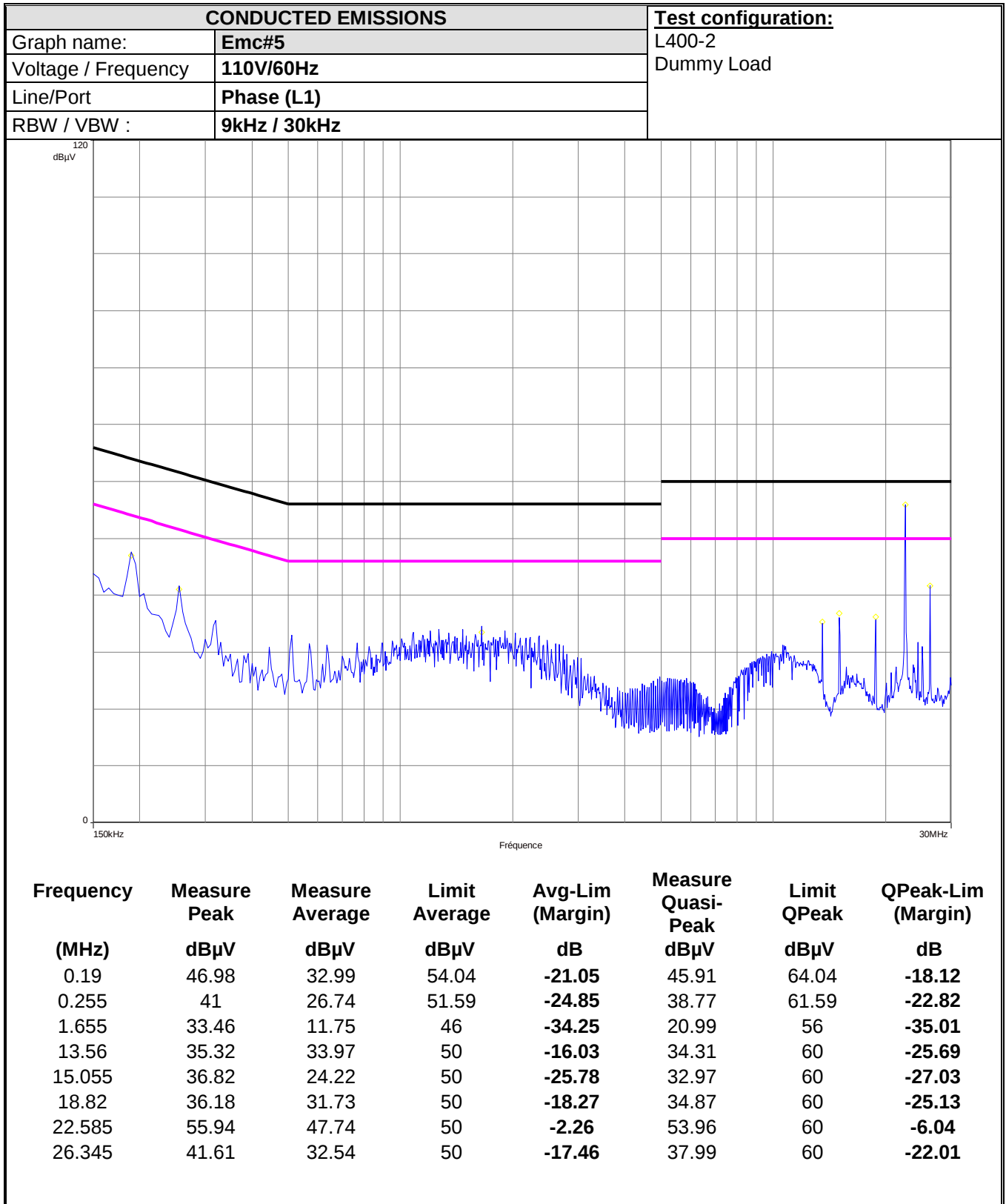
Frequency (MHz)	Mes.Peak (dBµV/m)
40.4	42.78
43.2	44.42
46	44.94
67.8	45.95
68.25	33.99
112.8	35.35
151.4	38.94
195.05	32.83
931.9	38.33

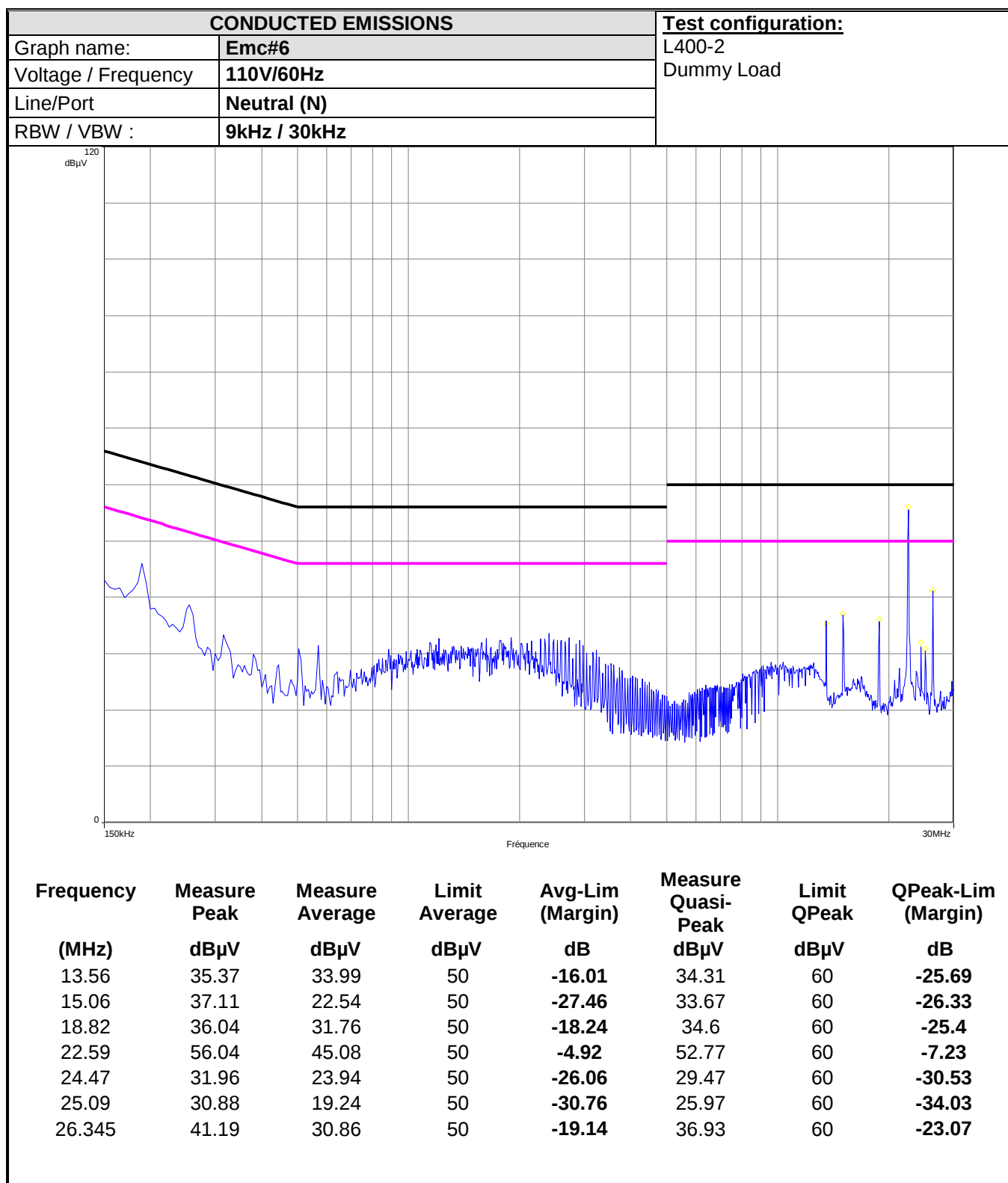














7. TEST EQUIPMENT LIST

	N°LCIE	TYPE	COMPANY	REF	SN
RADIATED EMISSION MEASUREMENT (PRE-SCAN SEMI-ANECHOIC CHAMBER #3)					
	A5329032VO	Absorption clamp	LUTHI	MDS21	2826
	A5329044VO	Absorption clamp	RHODE ET SCHWARZ	85024A	194.0100.50
	A7102024VO	Amplifier 8 GHz	HEROTEK	A1080304A	222033
X	A7102019VO	Amplifier 9 KHz – 1300 MHz	HEWLETT PACKARD	8447F Opt 64	3113A06394
	A7105006VO	Amplifier 9 KHz – 1300 MHz	HEWLETT PACKARD	8447D Opt 64	
	C2040051VO	Antenna Bi-log	CHASE	CBL6111A	1628
X	C2040149VO	Antenna Bi-Log XWing	TESEQ	CBL6144	25904
	C2042027VO	Antenna horn	EMCO	3115	6382
	C2042028VO	Antenna horn 26GHz	SCHWARZBECK	BBHA 9170	BBHA9170232
X	C2040052VO	Antenna Loop	ELECTRO-METRICS	EM-6879	690234
X	A5329045VO	Cable EMR (s-Anechoic chamber)			
X	A5329056VO	Cable Radiat EMI (Pre-amp/Analyzer)			
X	A5329057VO	Cable Radiat. EMI (Pre-amp/cage)			
X	D3044015VO	Semi-Anechoic chamber #3	SIEPEL		
	A4060033VO	Spectrum Analyzer 9KHz – 12.8GHz	HEWLETT PACKARD	8596E	3409u00537
	A4060018VO	Spectrum Analyzer 9KHz – 26.5GHz	HEWLETT PACKARD	8593E	3409u00537
X	A4060016VO	Spectrum analyzer 9kHz –1.8GHz	HEWLETT PACKARD	8591E	3536A00384
X	F2000404VO	Turntable chamber	ETS Lingren	Model 2165	00085780
X	F2000393VO	Turntable controller chamber	ETS Lingren	Model 2066	
X	A3169050VO	Radiated emission comb generator	BARDET		PR17B
RADIATED EMISSION MEASUREMENT (OPEN AREA TEST SITE)					
	A5329032VO	Absorption clamp	LUTHI	MDS21	2826
	A5329044VO	Absorption clamp	RHODE ET SCHWARZ	85024A	194.0100.50
X	A4049059VO	Adapter quasi-peak	HEWLETT PACKARD	HP85650A	2811A01134
	A7102024VO	Amplifier 8 GHz	HEROTEK	A1080304A	222033
	A7102026VO	Amplifier 8-26GHz	ALDETEC	ALS01452	1
X	A7102019VO	Amplifier 9 KHz – 1300 MHz	HEWLETT PACKARD	8447F Opt 64	3113A06394
X	C2040050VO	Antenna biconic	EMCO	3104C	9401-4636
	C2040051VO	Antenna Bi-log	CHASE	CBL6111A	1628
	C2042027VO	Antenna horn	EMCO	3115	6382
	C2042028VO	Antenna horn 26GHz	SCHWARZBECK	BBHA 9170	BBHA9170232
X	C2040056VO	Antenna log-periodic	EMCO	3146	2178
X	C2040052VO	Antenna Loop	ELECTRO-METRICS	EM-6879	690234
X	F2000288VO	Antenna mast	EMCO	1050	
	C2040057VO	Antenna monopole	AH SYSTEM	SAS-551	181
X	A5329048VO	Cable EMR OATS	SUCOFLEX	106G	553
X	A5329075VO	Cable OATS	UTIFLEX		
X	A5329188VO	Cable OATS (Mast at 10m)	UTIFLEX		
	A5329076VO	Cable OATS (Mast at 3m)	UTIFLEX		
	A5329196VO	Cable OATS (Turntable)	UTIFLEX		
	A2640011VO	Measurement receiver 9kHz–30MHz	ROHDE ET SCHWARZ	ESH3	972079/117
X	A4060027VO	Pre-selector RF	HEWLETT PACKARD	HP85685A	2837A00784
X	A3169050VO	Radiated emission comb generator	BARDET		PR17B
X	A4060017VO	Spectrum analyzer	HEWLETT PACKARD	HP8568B	2732A04155
	A4060018VO	Spectrum Analyzer 9KHz – 26.5GHz	HEWLETT PACKARD	8593E	3409u00537
	A4060016VO	Spectrum analyzer 9kHz –1.8GHz	HEWLETT PACKARD	8591E	3536A00384
X	A4060019VO	Spectrum analyzer display	HEWLETT PACKARD	HP85662A	2816A16603
X	F2000403VO	Turntable	ETS LINDGREN	2187	
X	F2000286VO	Turntable / Antenna mast controller	ETS Lingren	Model 2066	
CONDUCTED MEASUREMENT EMISSION					
X	A5329061VO	Cable Conduct. EMI (LISN/cage)			
X	A5329060VO	Cable Conduct. EMI (Receiver/cage)			
X	A3169049VO	Conducted emission comb generator	BARDET		CGPR12
	A5329037VO	Current injection probe	SCHAFFNER	CIP8213	52
	A1290017VO	Current probe	SCHAFFNER	CSP9160	1097



	N°LCIE	TYPE	COMPANY	REF	SN
	A5329036VO	Direct Injection Module 100 Ohms	LCIE	MID01-100 ohms	
	A5329042VO	Ferrite Tube	LUTHI	FTC 101	4485
	A1092042VO	Ferrite Tube	LUTHI	FTC101	4763
	C2320059VO	LISN	EMCO	3810/2SH	9511/1182
	C2320068VO	LISN	EMCO	3825/2	9309/2122
X	C2320061VO	LISN	TELEMETER ELECTRONIC	NNB-2/16Z	98010
	C2320062VO	LISN tri-phase ESH2-Z5	RHODE ET SCHWARZ	33852.19.53	841223/008
	C2320063VO	LISN tri-phase ESH2-Z5	RHODE ET SCHWARZ	33852.19.53	841223/007
	A2640011VO	Measurement receiver 9kHz–30MHz	ROHDE ET SCHWARZ	ESH3	972079/117
	C2320067VO	RSI 2 x 2 wires	RHODE ET SCHWARZ	ENY22	836727/015
	C2320066VO	RSI 4 wires	RHODE ET SCHWARZ	ENY41	838119/023
	A4049061VO	Transient limiter	HEWLETT PACKARD	11947A	3107A01596
	A4089117VO	Voltage probe	SMEE		
MISCALLENOUS (CONTROL EQUIPMENT)					
	A6440068VO	Data Logger	AGILENT	34970A	US37043935
	A2120003VO	Programable PSU, HAR/FLK	HEWLETT PACKARD	6842A	3531A00109
	A6440068VO	Data Logger Board	AGILENT	34901A	MY41037442
	D1022117VO	Climatic chamber	BIA CLIMATIC	CL 6-25	200 105 6
	A7043037VO	Power supply DC 30V 10A	ELC	AL924	95/00600
	A1240170VO	Multimeter	Fluke	87	75250745
	A1240171VO	Multimeter	FLUKE	189	89770115
	A4024018VO	Oscilloscope 500 MHz	Hewlett Packard	54542C	US36040602
	A4024019VO	Oscilloscope	Hewlett Packard	54720A	7426600
X	B4204052VO	Thermo-hygrometer	HUGER		
	A7043036VO	Power supply DC 300W / 150V-6A	SODILEC	7SDLIN/GB AUTO 300	493711
	A4083040VO	Oscilloscope 100 MHz 500Ms/s	Tektronix	TDS30-25	H712103

**8. UNCERTAINTIES CHART**

Type de mesure / Kind of measurement	Incertitude élargie laboratoire / Wide uncertainty laboratory (k=2) ± x	Incertitude limite du CISPR / CISPR uncertainty limit ± y
Mesure des perturbations conduites en tension sur le réseau d'énergie <i>Measurement of conducted disturbances in voltage on the power port</i>	3.57 dB	3.6 dB
Mesure des perturbations conduites en tension sur le réseau de télécommunication <i>Measurement of conducted disturbances in voltage on the telecommunication port.</i>	3.28 dB	A l'étude / Under consid.
Mesure des perturbations discontinues conduites en tension <i>Measurement of discontinuous conducted disturbances in voltage</i>	3.47 dB	3.6 dB
Mesure des perturbations conduites en courant <i>Measurement of conducted disturbances in current</i>	2.90 dB	A l'étude / Under consid.
Mesure du champ électrique rayonné sur le site en espace libre de Moirans <i>Measurement of radiated electric field on the Voiron open area test site</i>	5.07 dB	5.2 dB